Chapter 13 Summary

The Nature of Science and Organisms that are Neither Plant Animal.

1. Not all organisms fit into scheme designed by humans to classify them.
2. Schemes for classifying organisms are developed by scientist to help understand, organize and communicate about them.
3. As scientists learn more about the complexity of the living world, the system for classifying organizing also increase in complexity.
4. For a long time scientist classified living organisms as either plant of animal.
5. As biologist learned more about similarities and differences between organisms, they learned that it would be necessary for a third animal kingdom.
6. Biologist invented a third kingdom called Protista.
7. The protists included algae, bacteria, fungi, slime molds, mildew, and protozoans.

Viruses

* Characteristics of viruses

Scientists classify viruses into four groups, based on the host cells they infect. Bacterial viruses live in bacteria cells. Plant viruses live in the cells of seed plants. Animal viruses live in animal cells, and human viruses which live in human cells. Humans are also susceptible to some animal viruses.

Viruses are particles of protein and nucleic acid, about one-half to one-hundredth the size of the smallest bacterium.

* Unlike plants and animals and protists, viruses are not composed of cells. They are **acellular**.
* Viruses cannot manufacture their own food. They live and grow inside a living cell of a living organism called its host.
* When outside a living host cell, viruses do not demonstrate characteristics of living things.

Bacterial Viruses

1. Much of what we know about viruses comes from our study of bacterial viruses or **phage viruses.**
2. By studying the action of these viruses of bacteria, scientists have learned how viruses reproduce to make new viruses.

* When a viruses attaches to a bacterial cell, part of the viruses enter the cell.
* Attachment is a very specific process. Most viruses can enter and reproduce in only a few kinds of host cells.
* Once attached, the virus must enter the host and take over the cell metabolism
* The method of entry varies, depending on the shape and structure of the virus. Some viruses are shaped so that they inject their nucleic acid into the hosts’ cell. Other makes an indention and burst into the cell.
* Once inside the host cell the viruses quickly
* In a short time the bacterial cell the bacterial cell burst allowing 200-300 new viruses to escape.
* The new viruses are now free to enter and destroy other bacteria cells.

Plant Viruses

1. Several viruses are known to infect plat cells, causing a thousand or more plant diseases that damage or kill the plant host.

* Plant viruses can spread in many ways
* Most plant viruses are spread by insects such as the aphid and the leafhopper that suck juice from leaves.
* Some plant viruses spread when a lea of an infected plant comes into contact with a leaf of a healthy plant.
* Some plant viruses are spread through root contact.

Human and Animal Viruses

1. Viruses cause many diseases in humans and animals. Human and animal viruses’ viral diseases spread in a number of ways.

* Coughing sneezing spread viruses that infect the respiratory system. Such as the common cold. Some viruses are spread by mosquitos. Touching sores like chicken pox is another way to spread viruses.

1. Humans and animals may become immune to certain disease.

* When a person gets a viral disease their body makes different antibodies for different viruses.
* Antibodies cover the viruses to make them useless, but sometime viruses overwhelm the antibodies making the body more susceptible to other diseases.
* Some antibodies stay in the blood stream for life.

1. Not all viruses are harmful to the host cell.

* Some viruses go through what is called the lysogenic stage. This is a viral reproductive cycle where the viral DNA becomes integrated into the host cell’s chromosome. Once the viral DNA is inserted into the host cell chromosome it is called proviruses. Proviruses do not interfere with the normal function of the host’s cell, but every time the cell reproduces the proviruses is reproduced as well.
* The lysogenic process explains the reoccurrence of cold sores, the viruses causing it is called herpes simplex 1 will remain as a provirus. Chicken pox lies dormant from childhood but can return later in life as shingles.

1. The Control of Harmful Viruses

* Some viruses can be controlled with **vaccines** which are small amounts of weakened or dead viral particles. When a person gets a vaccine antibodies are produced and remain in the bloodstream making that person immune to that viruses.

1. Antibodies such as penicillin only work against bacterial infections and therefore unable to stop viral infections.
2. The following precautions help to prevent the spread of viral diseases.

* Cover your mouth when sneezing or coughing, avoid touching viral sores, avoid touching dead animals.

Bacteria

1. Bacteria can be found anywhere. In air, ocean, streams, ponds, soil, other organisms, plants, animals, and even in our intestines.
2. To live and thrive bacteria need suitable living conditions, which varies among different bacteria.
3. Some species thrive in extreme conditions.
4. Bacteria need water or moisture for growth.
5. Bacteria are classified into two growth the archaebacteria and eubacteria.
6. Archaebacteria live in extreme conditions.

* One group of archaebacteria lives in oxygen free zones.
* Another group of archaebacteria lives in saltwater.
* The third type of archaebacteria lives in hot conditions.

1. The eubacteria are more diverse in terms of habitat and metabolism.

* One type of eubacteria called heterotrophs live everywhere. Heterotroph bacteria need organic molecules and live as parasites. While others feed on dead organisms. They are called saprobes.
* Photosynthetic autotrophs bacteria get their energy from light.
* The third types of eubacteria are called synthetic autotrophs which get their energy from inorganic substances.

1. Bacteria are considered to be the smallest and simplest form of living things.

* Bacteria cells have no membrane bound or ganelles such as nucleus, mitochondrial or chlorophyll.

1. Bacteria shape and arrangement of their cells are used to classify them.

How Bacteria Reproduce.

1. Because they no nuclei, bacterial cannot reproduce by mitosis or meiosis. Instead they have evolved different methods of reproduction.

* They usually reproduce asexually by binary fission (4 steps- 1) cell grows in size. 2) The cell duplicates its single chromosome. 3) The pair of chromosomes separate and move to opposite sides of the cell. 4) The cell divides into two new daughter cells.)

Beneficial and Harmful Aspects of Bacteria

1. Most bacteria are harmless.
2. Humans have found many uses for bacteria.

* One group of bacteria sours milk which is important to making cheese and butter.
* Bacteria are in yogurt, sourdough bread, alcohol and vinegar.
* Bacteria are used in tanning leather, septic tanks and turn dean plant matter into humus which enriches the soil.
* Bacteria produce antibodies such as streptomycin and nocardicin.

1. Some bacteria are harmful to humans.

* Some bacteria spoil food producing poisons called **toxins**.
* Some bacteria are pathogens which mean they can cause disease.

Fungi

1. Fungi resemble viruses and bacteria in that they lack chlorophyll and cannot make their own food. Fungi are heterotrophic.

* There are more than 77,000 kinds of fungi including molds, mildews, yeast, rust, smuts, and mushrooms.
* Fungi vary in size. Some are microscopic while others combine to form larger structures like mushrooms.

1. Most fungi are made up of threads or filaments called **hyphae**.

* Each is made up of many cells, some with cell walls and some without cell walls.
* Unlike plants which have cell walls made of cellulose, the cell walls of most fungi contain a complex carbohydrate called the **chitin**.

1. Fungi grow best in dark conditions of moist and warm darkness.
2. Because fungi cannot produce their own food they must get their food from other sources.

* Some fungi are parasites. Parasitic fungi invade their hosts with specialized hyphae called **haustoria**, which penetrate the host cell without killing them.
* Other fungi are **saprobes** which get their food from dead animals and plants.
* Some fungi live with other organisms in a mutual symbiotic relationship called **mutualism**.

1. Nearly all fungi are **aerobic** which means they are able to use oxygen.
2. All fungi can reproduce sexually by forming gametes, by **meiosis**.

* The male haploid cell is called an egg.
* The male and female cells unite- fertilization, to form a diploid cell called a **zygote**.
* Zygotes form new parent fungi.

Molds

1. Most molds grow best in places that are dark, damp and warm and some grow well at temperature near freezing. They can grow on most foods, paper, leather, wood and human skin.
2. Most molds are made up of tubular threads called hyphae.
3. Some fungi reproduce a sexually.

Mildew and Yeast

* Mildews are whitish or dark colored fungi and are closely related to molds.
* Yeasts are microscopic one celled fungi usually oval in shape that reproduce asexually by budding.
* Yeasts are important to humans. Yeast is used to ferment alcohol and for making bread.
* Yeasts are an important source of vitamin B for humans.
* Some yeasts cause infections in humans.

Rust and Smuts

1. Rust and smuts are parasitic fungi that thrive under moist dark and warm conditions.

* Rust produce reddish brown spores that look like rust and they destroy such plants like apple trees, wheat, white pine trees, roses, oranges and melons.
* Smut produce black spores and can destroy grains such as corn, barley and oats.

Mushrooms

1. Mushrooms are the largest fungi.
2. They produce saprobes living on dead animal and plant matter in the soil.
3. They grow underground for years producing a large mass of tangled threads that eventually come together to form the familiar white caps.
4. When the weather is damp especially in spring and fall the closely packed mass pushes above ground to form the cap.

Slime molds:

* usually grow on damp, decaying leaves and can be various colors.
* are different from true molds because slime molds are both animal-like and plant-like during their life cycle.
* begin as one-celled organisms, having thread-like hairs called flagella, that move around as they feed and grow.
* then individuals come together to form very large colonies of slime molds.
* towards the end of their life cycle, slime mold colonies move to a drier place where they stop moving and begin to produce spore cases.

Lichens:

* are two organisms—either a green alga or a cyanobacterium/fungus—that live together in a special form of symbiosis called mutualism.
* usually are green because of the green algae they contain.
* grow on the bark of trees, on the ground and rocks.
* cannot survive in polluted air or acid rain conditions.
* have been used in making dyes, in tanning hides for leather, and in making perfumes.

Algae:

* Classification:
  + contain chlorophyll and, therefore, are considered to be autotrophs that are capable of making their own food through photosynthesis.
  + classified into five (or six when euglenoids are included) phyla.
* Structure:
  + some are unicellular and others are multi-cellular.
  + many are mobile; all are aquatic or semi aquatic (living in very moist habitats)
  + many are shaped like threads and are called filaments that can be attached to one another to form colonies.
  + many have jelly-like cell covering that protects the cell from dehydration.
* Reproduction:
  + can reproduce in several ways; all algae can reproduce asexually through mitotic cell division or fission.
  + many reproduce asexually by forming spores.
  + some reproduce sexually through meiosis, which results in gametes.
* Types:
  + Euglenoids: belong to the phylum Euglenophyta; are green, aquatic, unicellular, autotrophic/heterotrophic organisms that display traits of both plants and animals.
  + Diatoms: belong to the phylum Bacillariophyta; unicellular organisms with cell walls that create a shell made of silica; are photosynthetic autotrophs having distinctive shapes; have cell walls that are filled with a glass-like material called silica.
  + Dinoflagellates: belong to the phylum Dinophyta; are unicellular and autotrophic having walls made of thick cellulose plates; have two flagella and are commonly called the spinning algae; reproduce by mitotic cell division; mostly marine.
  + Red Algae: belong to the phylum Rhodophyta; are marine, multicellular, red seaweeds; live in tropical and colder waters; some in deep water; reproduce sexually.
  + Brown Algae: constitutes the phylum Phacophyta; some cells of the colonial forms have been specialized; smaller forms usually reproduce asexually by fission.
  + Green Algae: belong to the phylum Chlorophyta; color ranges from bluish- to yellowish-green; most live in freshwater, some in oceans, some onland on moist soil, others on tree trunks; most diverse with more than 7,000 species worldwide; some are unicellular others are multicellular; reproduce asexually by mitotic cell division or by spores.
* Uses:
  + chief source of food for many aquatic animals
  + major source of the Earth’s atmospheric oxygen
  + can be used by coastal farmers for fertilizing the soil (brown algae)
  + can be used as a thickening agent (brown algae)

Protozoans:

* Tiny, one-celled, animal-like protists
* most live independently, but some live together in colonies
* live either in water or where conditions are moist
* most are not autotrophic, but are heterotrophic
* four main types: amoebas, paramecia, and spore-forming
* are important members of the food chain for fish and other aquatic animals
* helpful because they eat large amounts of bacteria that may be harmful
* cause serious diseases, such as amoebic dysentery